NED Release Notes
December 2003

The December 2003 release of the National Elevation Dataset (NED) represents the 22nd update since the 1-arc-second NED bi-monthly maintenance schedule began in June 2000. This release includes existing source data and all new 7.5-minute digital elevation models (DEMs) available in the USGS Sales Database (SDB) as of November 1, 2003. Areas where the new source data were incorporated for this release (and previous releases) are indicated in Figure 1. Figure 2 indicates the combined areas updated in the August 2003, October 2003, and December 2003 releases.

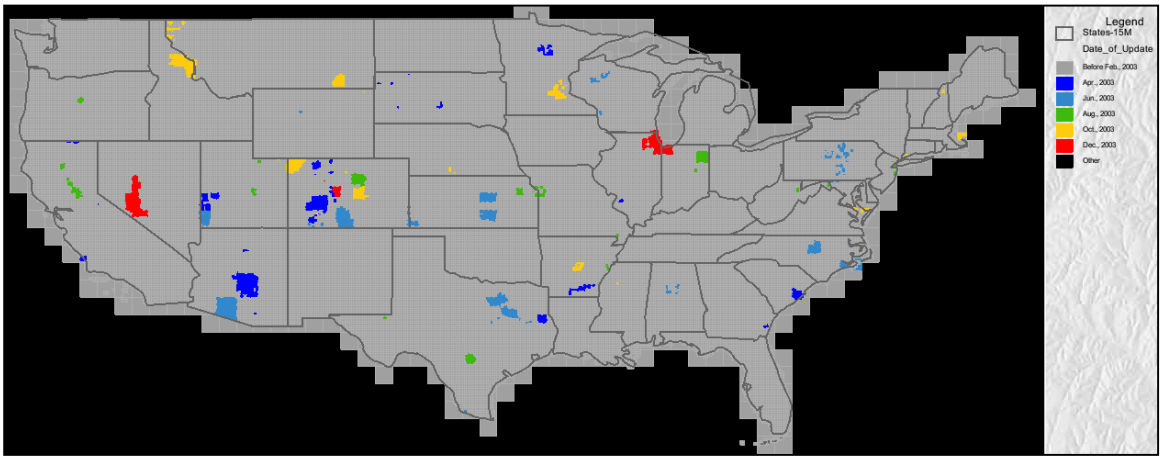

Figure 1. 1-arc-second NED update areas, by release date.

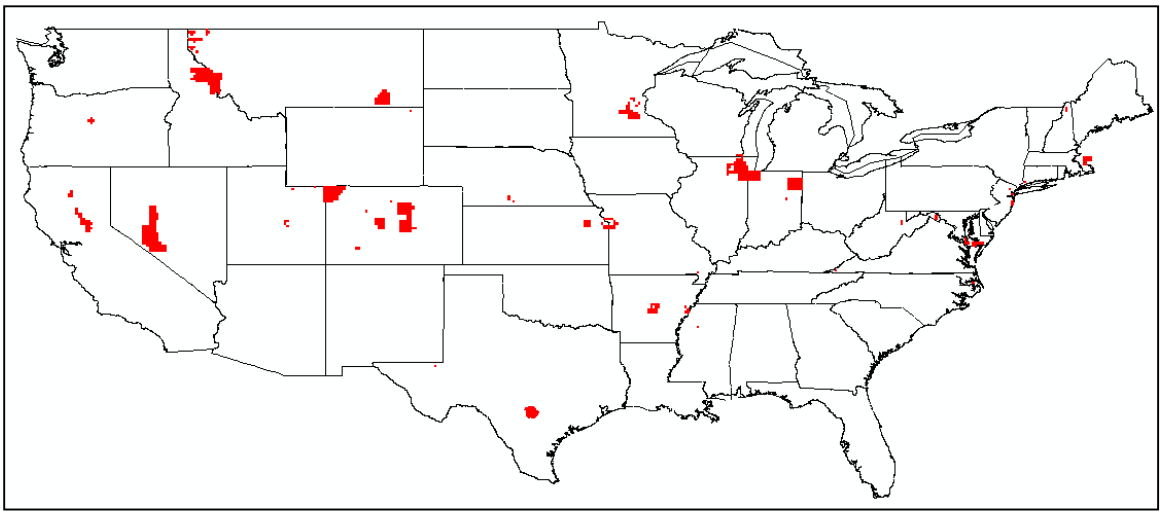

Figure 2. 1-arc-second NED areas updated in August 2003, October 2003, and December 2003 releases.

NED Tile Processing

NED is processed and stored internally as 1ºx1º tiles. The number of tiles, and changes by release date, are listed in Table 1.

Release date	Number of tiles	Note
June 2000	1,367	CONUS: 925 tiles; AK: 428 tiles; HI: 14 tiles
April 2001	1,375	8 tiles added: Puerto Rico and Virgin Islands
June 2001	1,387	12 tiles added: Pacific islands
August 2001	1,392	5 tiles added: Pacific islands
December 2003	1,392	

Table 1. Number of 1-arc-second NED tiles and changes, by release date.

For the current release, 36 tiles were updated, which represents 4% of NED (not including Alaska tiles). The number of NED tiles processed for each of the last 22 releases is shown in Figure 3.

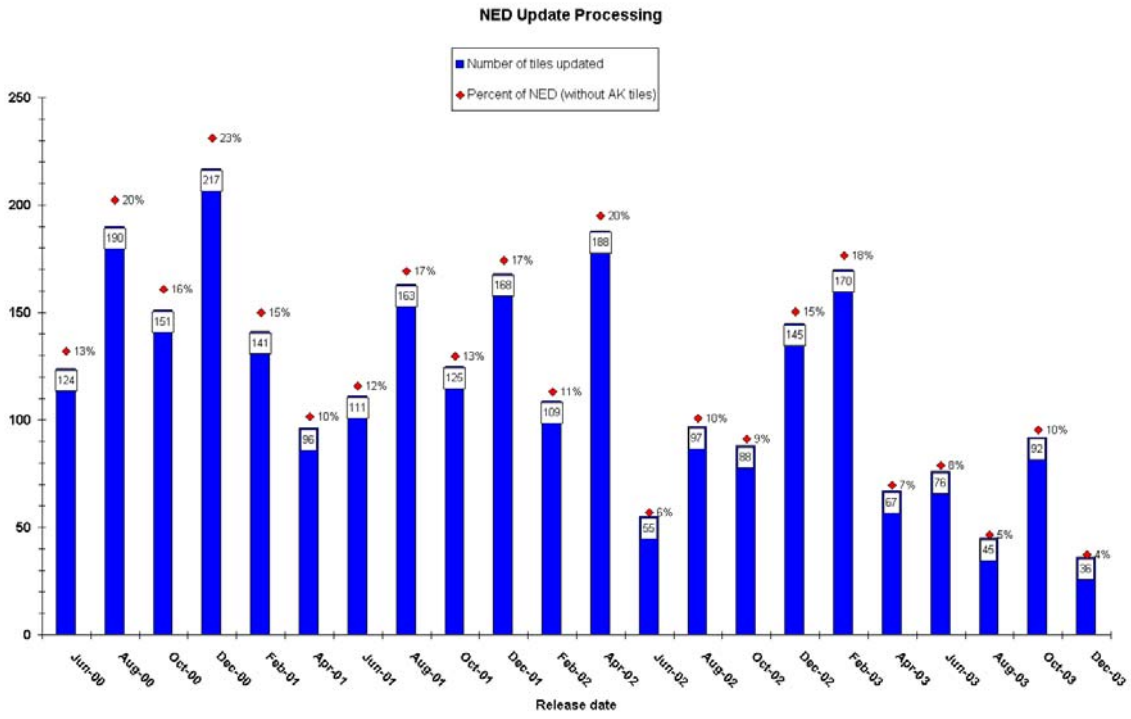

Figure 3. Number (and percentage) of 1-arc-second NED tiles processed, by release date.

NED Source Data

NED source data are selected from the available USGS DEMs according to the following ranking (highest priority listed first): 10-meter, 30-meter Level 2, 30-meter Level 1, 2-arc-second, 3-arc-second. The composition of the source data used in NED continued the trend seen in previous releases with 10-meter DEMs increasing and the corresponding decrease in 30-meter DEMs. Thus, the ongoing production of USGS 10-meter DEMs is reflected in each NED release. For the first time, the December 2003 release includes more 10-meter DEMs than 30-meter Level 2 DEMs. The number of source DEMs (by type) and the percentage of 1-arc-second NED derived from each type for each of the last 22 releases are shown in Figure 4 and Figure 5, respectively. Note that only 7.5-minute DEMs were included for Figures 4 and 5, so the totals and percentages do not include Alaska, which is derived mostly from 2-arc-second source data.

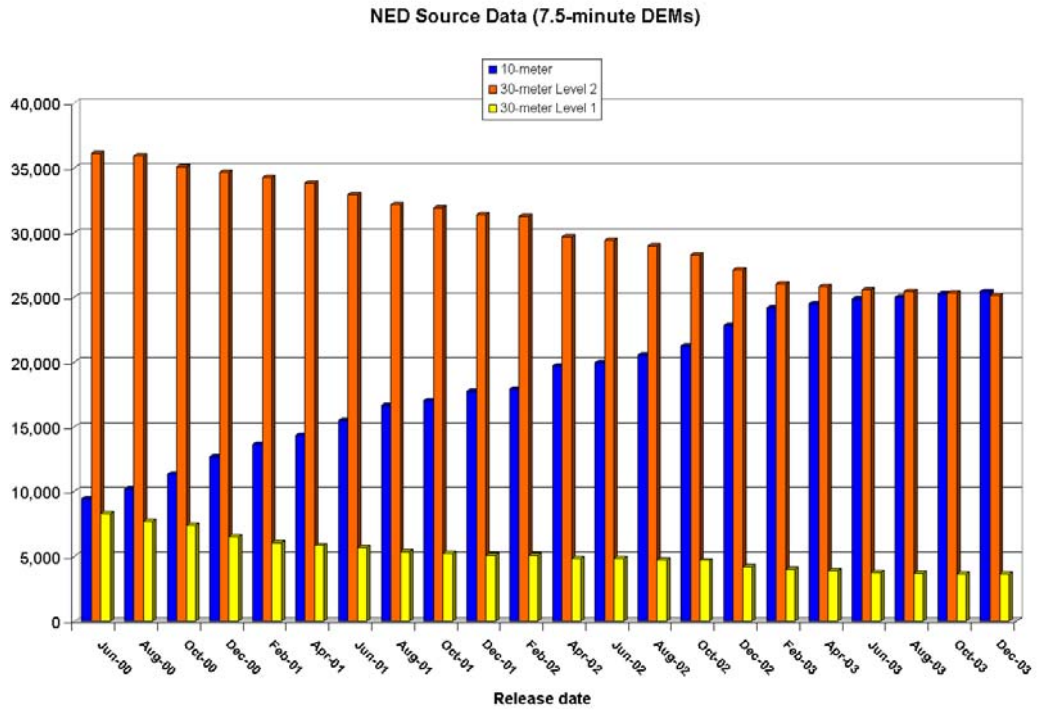

Figure 4. 1-arc-second NED source data (by DEM type) for recent releases.

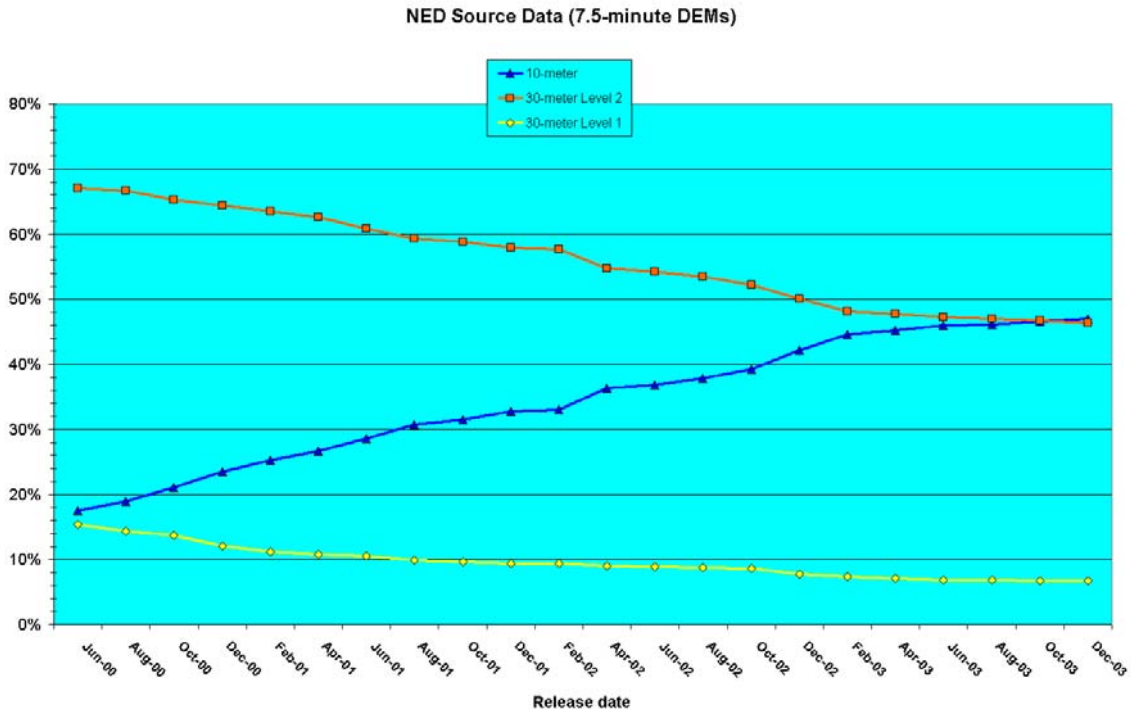

Figure 5. Percent of 1-arc-second NED source data (by DEM type) for recent releases.

The changes in NED source data since the previous releases are described in Table 2.

Release date	10-meter added	10-meter removed	30-meter Level 2 added	30-meter Level 2 removed	30-meter Level 1 added	30-meter Level 1 removed	Total added	Total removed	Net added
June 2001	1,288	176	31	919	0	134	1,319	1,229	90
August 2001	1,181	6	96	871	49	375	1,326	1,252	74
October 2001	488	95	205	479	76	196	769	770	-1
December 2001	715	22	182	689	12	189	909	900	9
February 2002	151	0	3	121	15	40	169	161	8
April 2002	1,801	2	28	1,649	1	187	1,830	1,838	-8
June 2002	258	16	1	222	3	21	262	259	3
August 2002	711	138	211	669	1	117	923	924	-1
October 2002	788	36	6	683	0	48	794	767	27
December 2002	1,835	254	5	1164	4	451	1,844	1,869	-25
February 2003	1,332	14	7	1076	1	253	1,340	1,343	-3
April 2003	325	10	24	223	1	118	350	351	-1
June 2003	457	40	5	283	2	141	464	464	0
August 2003	153	33	1	108	1	12	155	153	2
October 2003	269	36	4	159	12	89	285	284	1
December 2003	208	10	1	184	0	15	209	209	0

Table 2. Changes in 1-arc-second NED source data (7.5-minute DEMs).

As recorded in the NED spatially referenced metadata, the composition of the 1-arc-second NED source data may be described in terms of specific characteristics of the source DEMs. Table 3 and Table 4 show the number of DEMs by production method and production site, respectively, for the current and previous releases. Note that in the current release 6.3% of NED is derived from DEMs produced with photogrammetric methods (GPM and MP), while nearly 87% of NED is derived from DEMs produced from hypsography processed with LT4X.

Release date	GPM	MP	CTOG	DCASS	LT4X	Unknown
August 2001	2,332	3,061	6,759	230	44,845	476
October 2001	2,281	2,988	6,091	235	45,627	469
December 2001	2,168	2,919	5,515	238	46,360	440
February 2002	2,146	2,911	5,250	238	46,560	427
April 2002	2,084	2,786	4,921	233	47,078	424
June 2002	2,084	2,768	4,917	232	47,099	424
August 2002	2,033	2,705	4,889	232	47,239	407
October 2002	2,018	2,672	3,767	229	48,439	406
December 2002	1,791	2,435	3,683	220	48,954	404
February 2003	1,727	2,263	3,591	216	49,277	390
April 2003	1,704	2,169	3,584	216	49,400	390
June 2003	1,672	2,061	3,575	215	49,564	377
August 2003	1,670	2,050	3,576	215	49,572	371
October 2003	1,647	1,986	3,539	215	49,682	373
December 2003	1,645	1,973	3,520	215	49,716	375

Table 3. 1-arc-second NED source DEMs, by production method.

Release date	MAC	MCMC	RMMC	WMC	Contractor	FS	BLM	EMC	Unknown
August 2001	1,748	9,476	8,109	2,706	22,046	9,450	379	258	3,531
October 2001	1,721	9,480	8,090	2,726	22,193	9,406	366	258	3,450
December 2001	1,672	9,426	7,957	2,727	22,506	9,375	364	261	3,348
February 2002	1,620	9,392	7,916	2,721	22,597	9,349	352	260	3,312
April 2002	1,581	9,388	7,744	2,931	23,063	8,985	322	259	3,201
June 2002	1,582	9,377	7,755	2,955	23,118	8,920	313	259	3,119
August 2002	1,561	9,520	7,758	2,971	23,217	8,798	311	256	3,113
October 2002	1,516	9,547	7,792	2,963	23,446	8,674	262	255	3,076
December 2002	1,407	9,278	7,645	3,051	23,706	8,328	253	250	3,587
February 2003	1,412	9,214	7,505	3,021	24,061	8,361	214	236	3,440
April 2003	1,407	9,244	7,555	3,008	24,185	8,245	213	229	3,377
June 2003	1,400	9,336	7,568	2,973	24,249	8,217	205	224	3,292
August 2003	1,402	9,313	7,585	3,004	24,233	8,201	205	224	3,287
October 2003	1,402	9,321	7,580	3,052	24,216	8,200	203	223	3,254
December 2003	1,385	9,330	7,679	3,052	24,186	8,141	203	222	3,246

Table 4. 1-arc-second NED source DEMs, by production site.

NED Processing Notes

The following items from the October 2003 NED maintenance are noted:

- The most notable feature of this update is a reduction in the grand total of source DEMs (all resolutions included) from the previous update. This is due to more rigorous sliver removal methods used for the first time in this update.

Miscellaneous Notes

- The following are available via anonymous FTP: the NED spatial metadata in Shapefile and Arc Export format, the NED data dictionary with definitions of the attributes of the spatial metadata coverage, previous issues of the NED Release Notes, and Shapefiles that outline the areas updated in the December 2003 and previous releases. The FTP site for these items is: ftp://edcftp.cr.usgs.gov/pub/data/ned/

NED Accuracy Assessment

The overall absolute vertical accuracy of 1-arc-second NED has been assessed by comparison to an independent reference dataset, the high accuracy geodetic control points maintained and distributed by the National Geodetic Survey (NGS). The initial assessment was done in September 1999 using 5,811 High Accuracy Reference Network (HARN) points located throughout the conterminous United States. At that time, some small areas of NED in the conterminous United States were still based on 2-arc-second or 3-arc-second data. Also, less than 15% of NED was derived from 10-meter DEMs. The accuracy assessment was conducted again in October 2001 using the same 5,811 HARN points for reference. At that time, the conterminous U.S. NED was derived entirely from 7.5-minute source DEMs, with nearly one-third being 10-meter DEMs. The accuracy assessment was conducted a third time in November 2002, with the reference dataset being the NGS GPS on benchmarks dataset (5,874 points; Figure 6). A fourth accuracy assessment was completed in October 2003. The vertical accuracy (expressed in meters) calculated in each assessment is presented in Table 5. The numbers are presented as the root mean square error (RMSE) and also as the equivalent metrics in the National Map Accuracy Standards (NMAS; 90% confidence) and the National Standard for Spatial Data Accuracy (NSSDA; 95% confidence). The trend of an improving overall absolute vertical accuracy continues as the source data for 1-arc-second NED are upgraded.

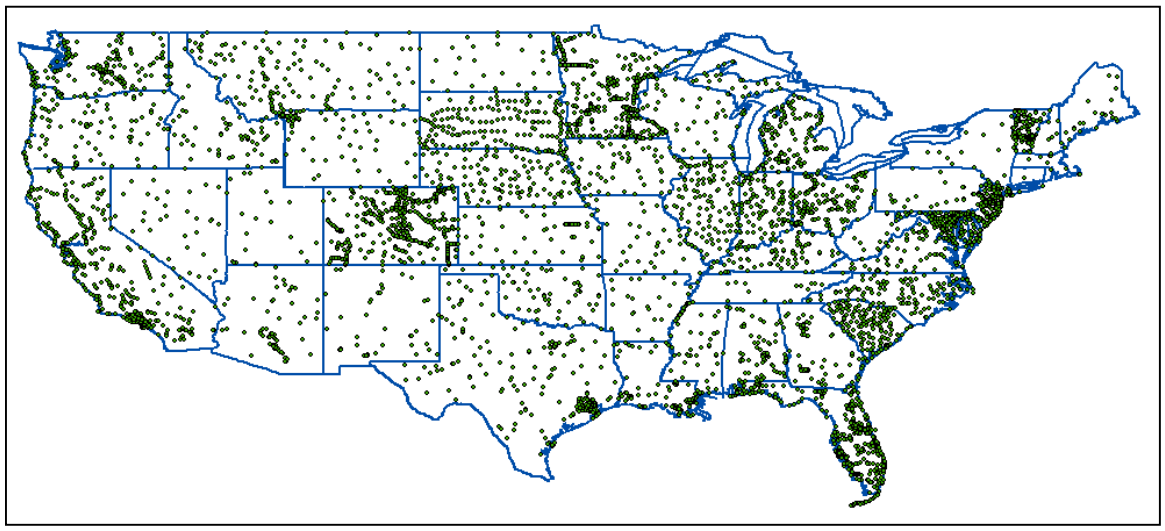

Figure 6. NGS control points used for NED accuracy assessment.

Date of assessment	RMSE	NMAS (90%)	NSSDA (95%)
September 1999	3.74 meters	6.15 meters	7.34 meters
October 2001	3.13 meters	5.15 meters	6.14 meters
November 2002	2.70 meters	4.44 meters	5.29 meters
October 2003	2.59 meters	4.26 meters	5.08 meters

Table 5. NED vertical accuracy based on a comparison with NGS control points.

Multi-resolution NED

In addition to the standard 1-arc-second resolution, NED data for a portion of the United States are available in 1/3-arc-second resolution (approximately 10 meters). These higher resolution data have been produced where 10-meter DEMs are available as NED source data. Figure 7 shows the current coverage of 1/3-arc-second NED, which covers nearly 43% of the conterminous United States. Some of the 1/3-arc-second NED is derived from "non-standard" source data (data other than standard USGS 7.5-minute DEMs). Two areas derived from non-USGS source data are Bexar County in south central Texas (Figure 8) and eastern North Carolina (Figure 9). The Bexar County area is derived from photogrammetrically-produced elevation data, and the North Carolina area is derived from lidar data. Production of 1/3-arc-second NED is continuing, and additional areas will be made available as they are completed. The data are available for download and on media copies through the seamless data distribution system (SDDS) (http://seamless.usgs.gov).

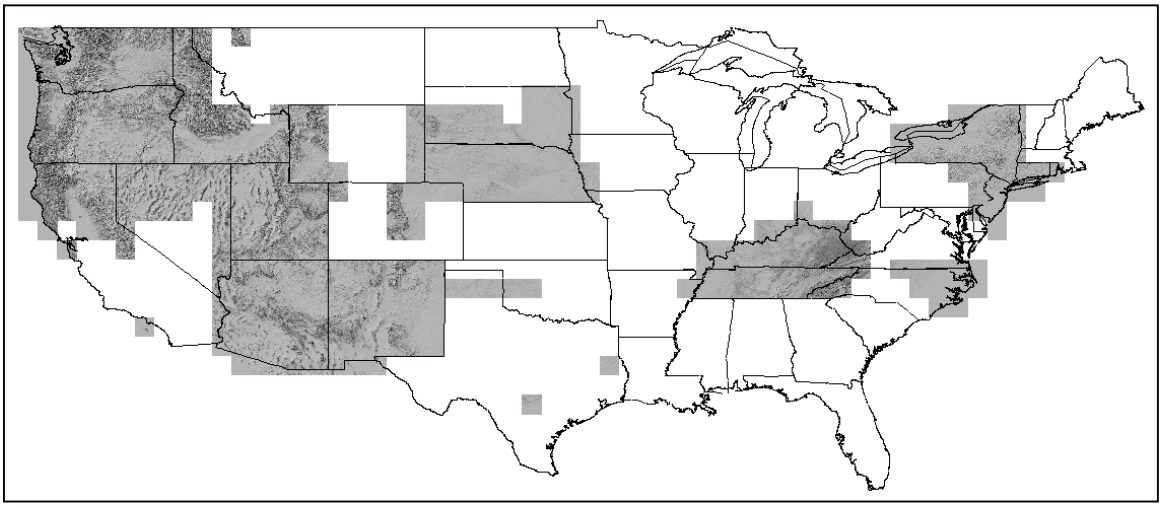

Figure 7. 1/3-arc-second NED available for distribution through the SDDS.

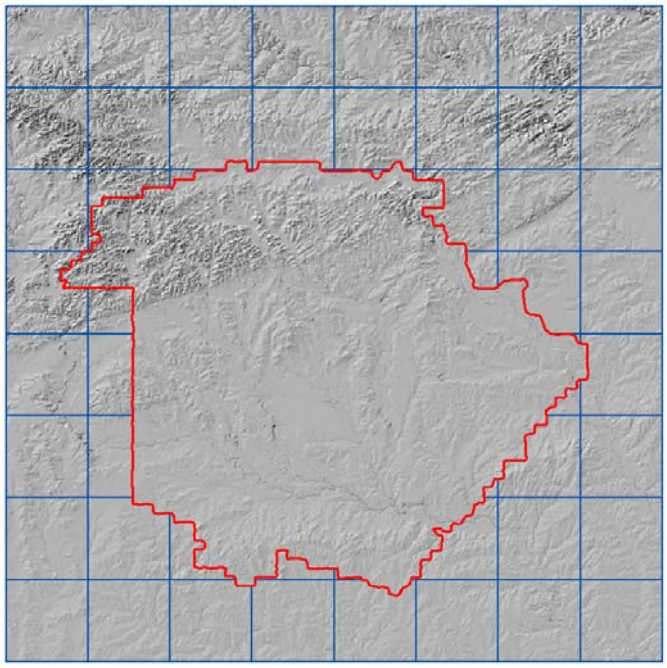

Figure 8. 1/3-arc-second NED for Bexar County, Texas area. The NED data derived from photogrammetric data (mass points and breaklines) is outlined in red.

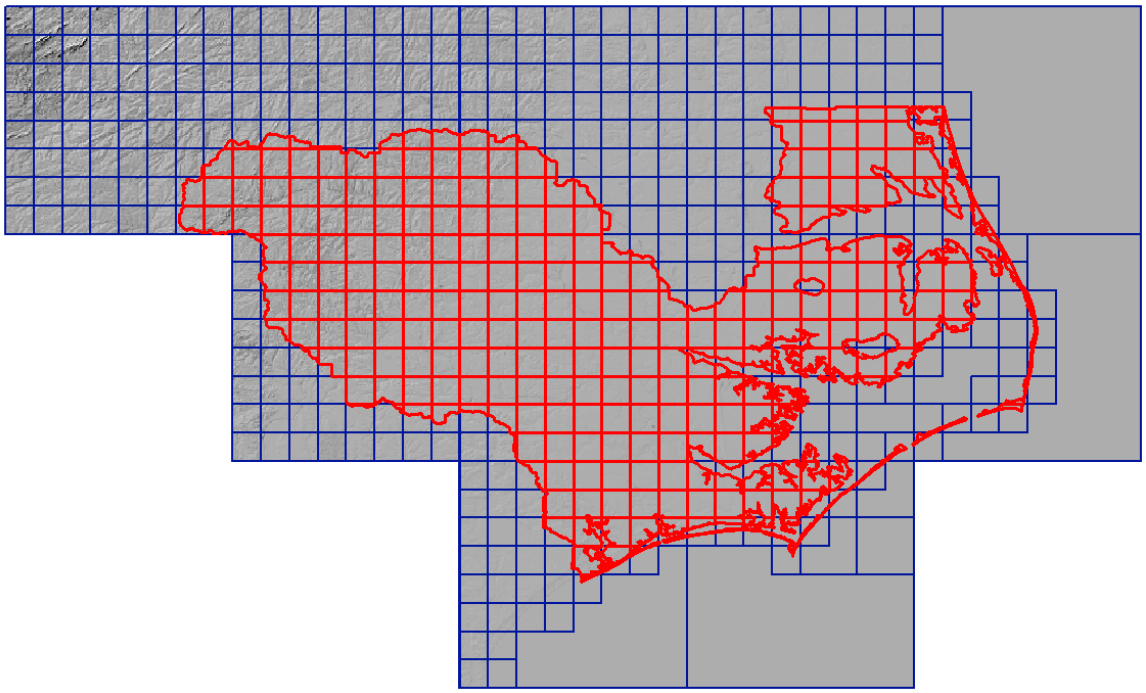

Figure 9. 1/3-arc-second NED for eastern North Carolina area. The NED data derived from lidar data is outlined in red.

Processing and updating of the 1/3-arc-second NED occurs in the alternating months in which the 1-arc-second NED does not have a scheduled update. Figure 10 shows the areas for which 1/3-arc-second NED was produced since June 2003. The newly available data cover an area equivalent to that covered by 448 7.5-minute quadrangles.

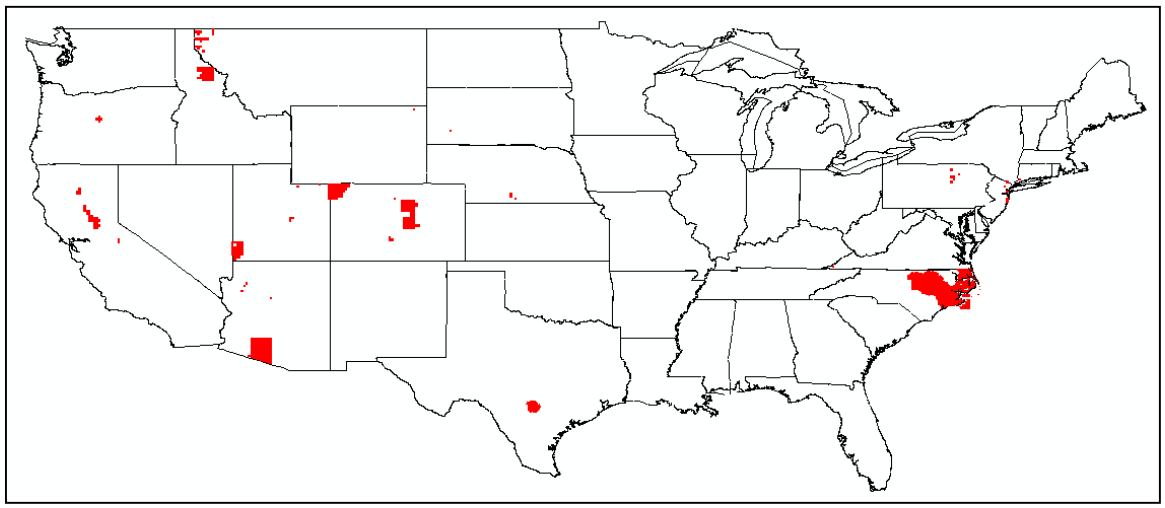

Figure 10. 1/3-arc-second NED data produced since June 2003.

In October 2003, the first area covered by 1/9-arc-second NED data became available on the SDDS. High-resolution lidar data were used to produce 1/9-arc-second resolution (approximately 3 meters) NED for the Puget Sound region in Washington. Figure 11 shows the area covered by the 1/9-arc-second NED.

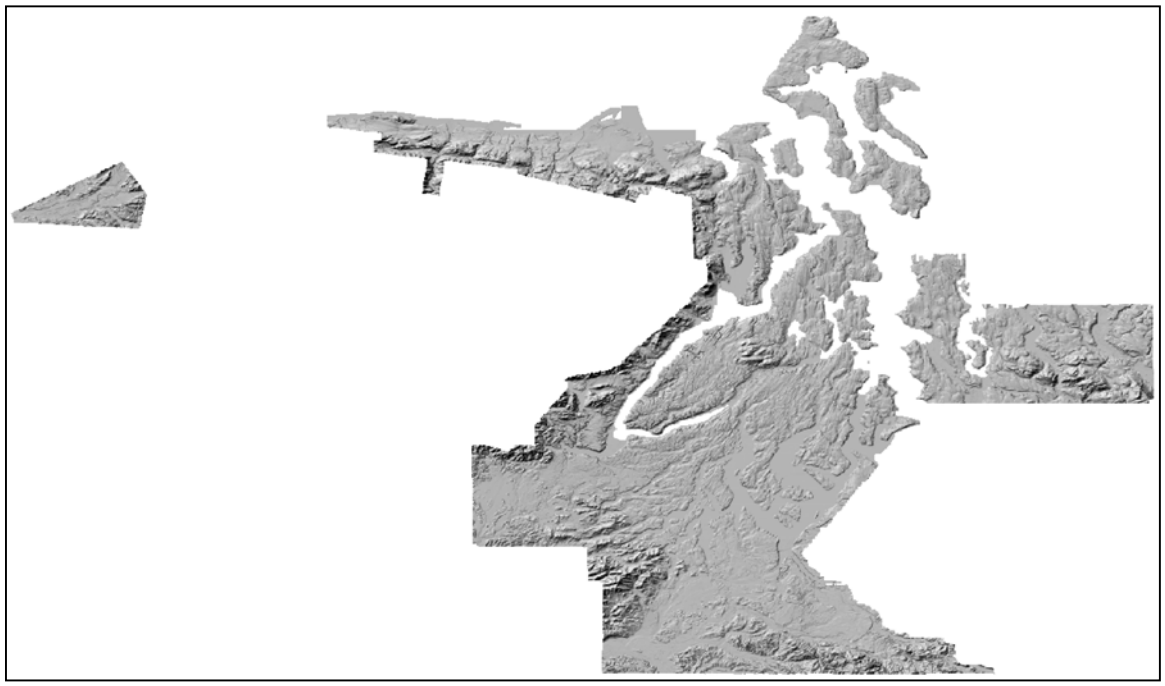

Figure 11. 1/9-arc-second NED coverage of the Puget Sound area.

NED Data Distribution Statistics

Data distribution statistics for 1-arc-second NED and 1/3-arc-second NED, for FY2003 and the beginning of FY2004, are shown in Figure 12 and Figure 13, respectively.

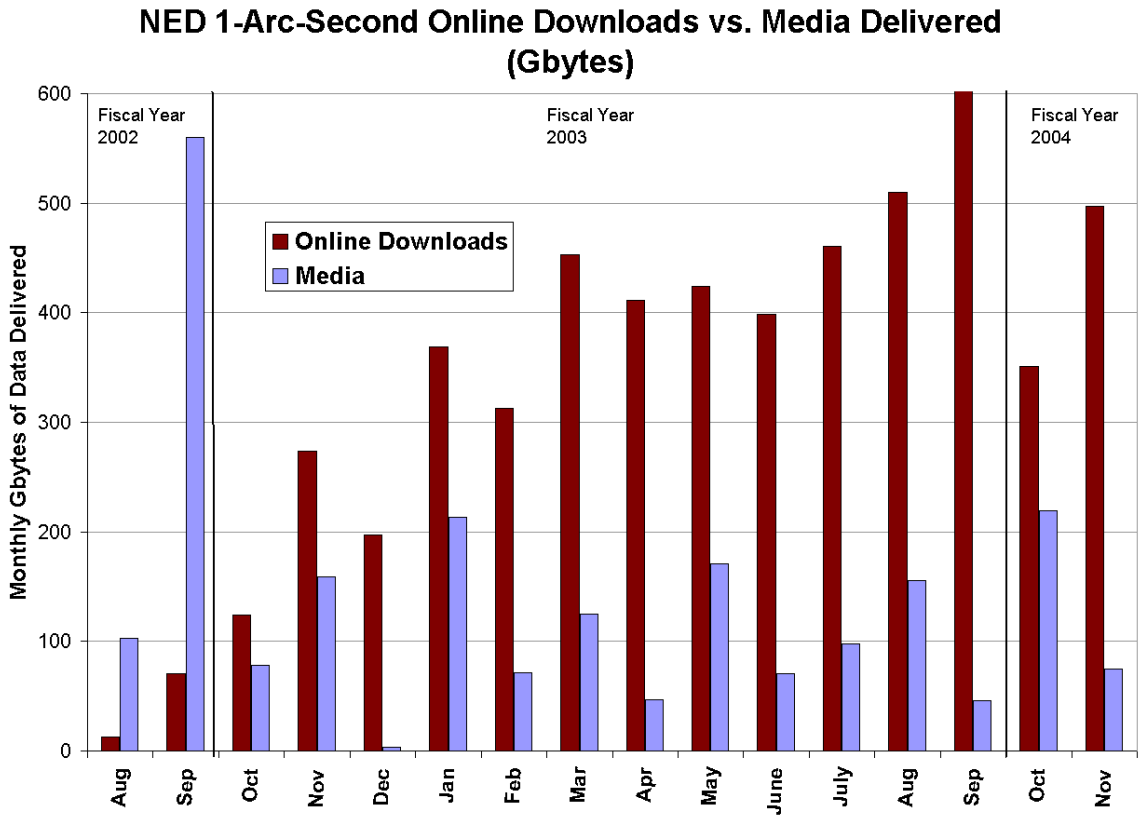

Figure 12. Data distribution statistics for 1-arc-second NED.

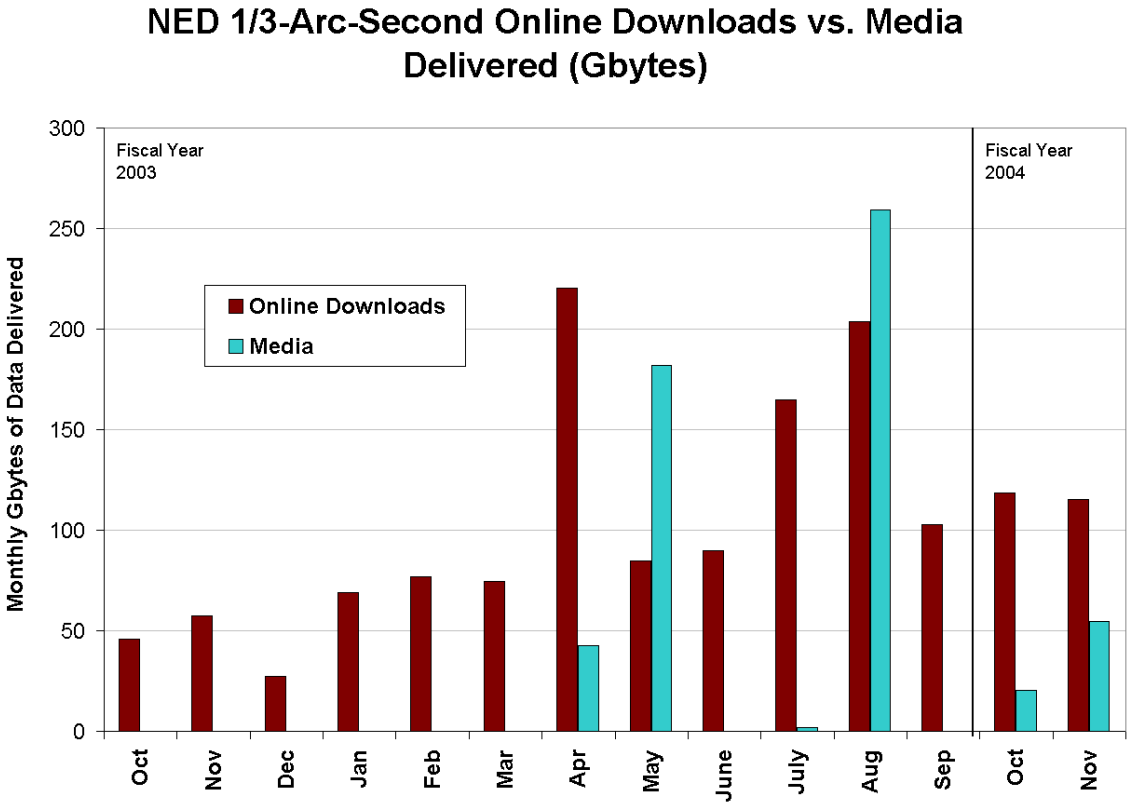

Figure 13. Data distribution statistics for 1/3-arc-second NED.